

PESTE DES PETITS RUMINANTS
THE NEXT ERADICATED ANIMAL DISEASE?

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INRA
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Introduction

The disease and its distribution

The virus

The control tools

Feasibility of eradication

Prospects for future research

Concluding remarks

Introduction

- **Peste des petits ruminants**

- Serious viral disease of small ruminants
- Maintained in enzootic transmission in large belts across Africa, Middle East and Asia
- Increasing spread in the last 2 decades
- One billion small ruminants are at risk annually.

- **Sheep and goats**

- Play major role in rural economics
- Managed under many production systems
- Principal source of income and play a major role in the survival during drought and famines

The disease

- **Disease course**
  - ✓ **Incubation period:** 3-6 days
  - ✓ **Prodromal stage:** pyrexia 40-41 °C / 2-3 days
  - ✓ **Death** 12-14 days **or recover**

- **High morbidity and high mortality:**
  - ✓ **Acute: 80-100% morbidity**
  - ✓ **Exception (example Morocco):**
    - Morbidity 11 to 18% in sheep / goats
    - Mortality 5 to 6 %

The disease

- **Sheep and goats**

Febrile illness

3 "Ds": diarrhoea, discharges and death

Conjunctivitis

Mucopurulent ocular and nasal discharges

Erosion of the mucosa

Diarrhoea

Highly contagious disease

Easily transmitted by direct contact with secretions and/or excretions of infected animals

Symptoms often confused with other diseases (pasteurellosis, CCPP…)

The disease

- **Sheep and goats**

Death caused by
bronchopneumonia or severe dehydration

PPRV may cause disease in other species

- **Cattle, suids, wild artiodactyles :**

Sub-clinical infection :

Seroconversion

Rare clinical signs: RP-like in buffaloes (India)

- **Camelids**

Prominent signs are:
Respiratory syndrome,
Cachexia & Death

The disease

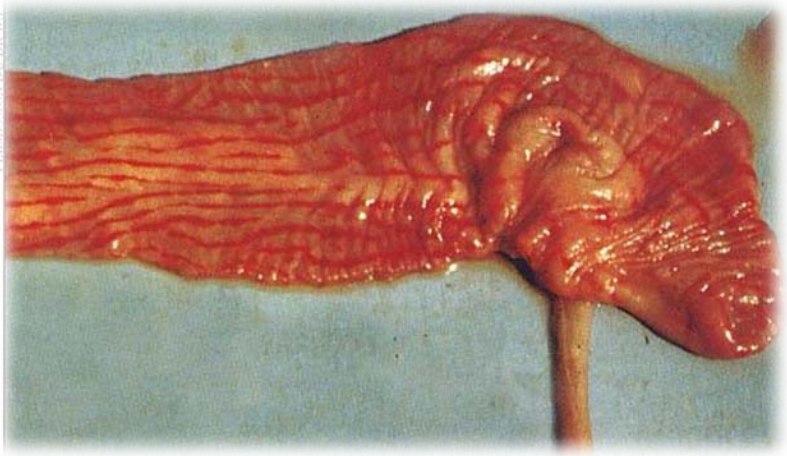
- Local replication at entry sites
- Viremia & infection of lymphoid cells
- Secondary disseminated replication in all epitheliums
- Lesions

✓Congestion, oedema and erosions:

✓ Digestive tract

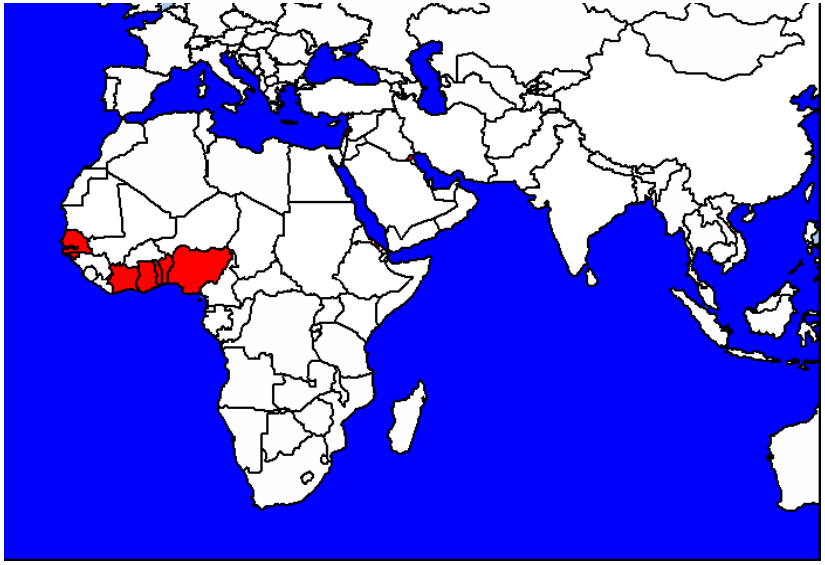
✓ Respiratory tract

✓ Lymphoid tissues lymph nodes, spleen

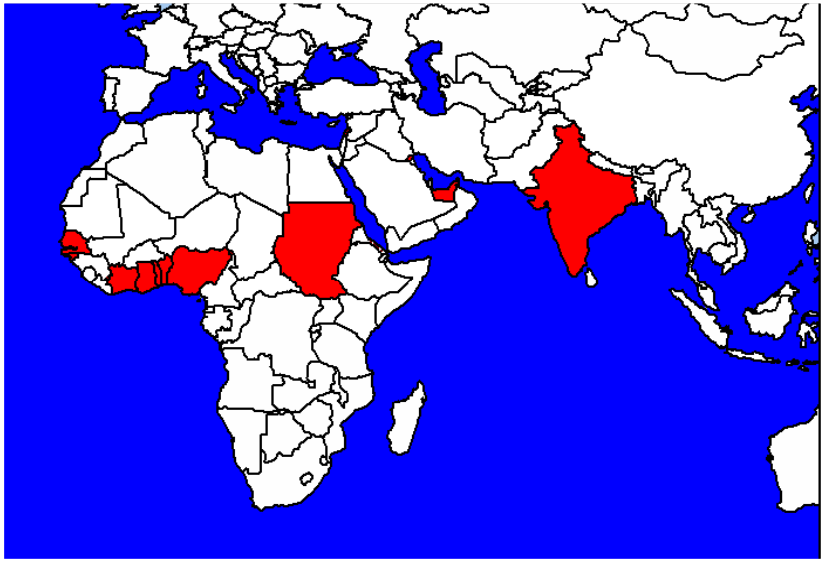


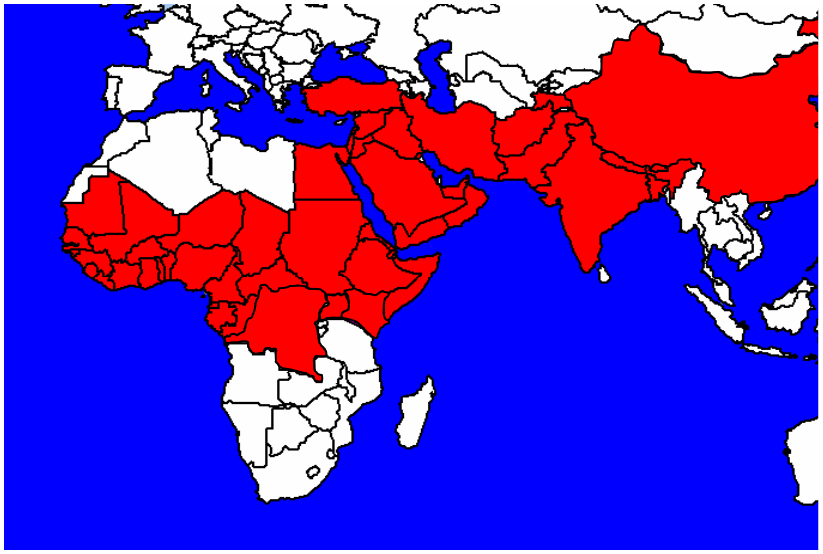
An emerging disease!

1942-1972

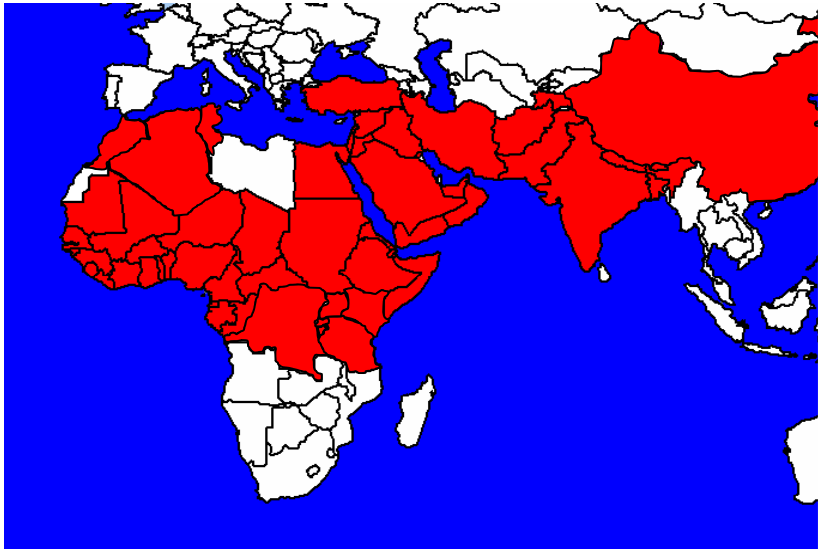


1973-1987





1988-2007

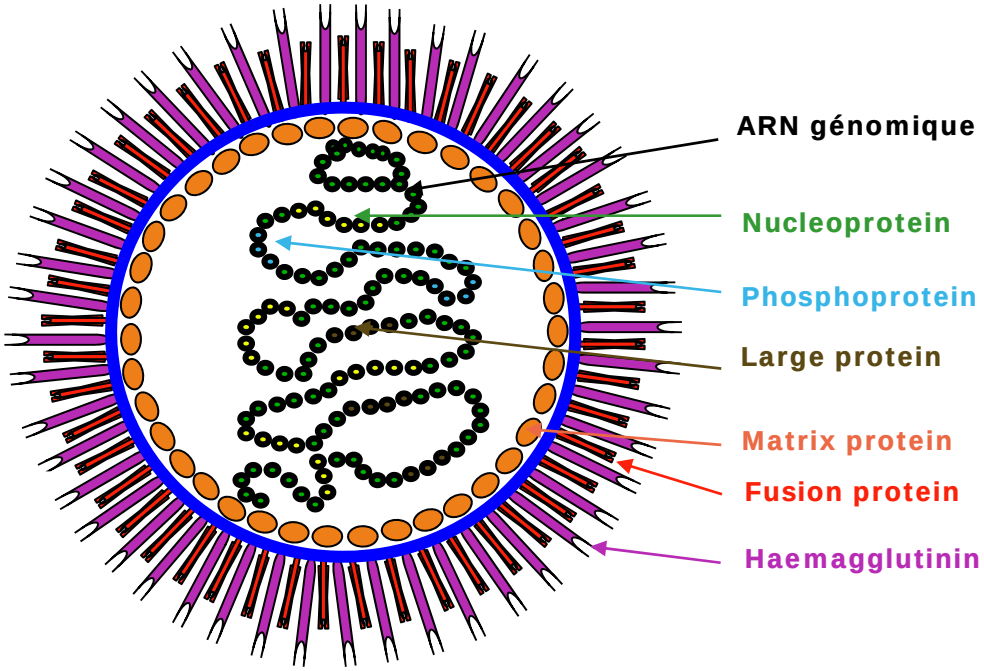


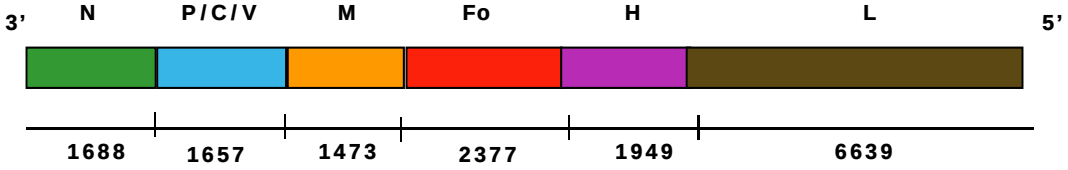
2007-2012

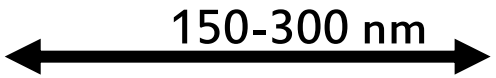
The virus

An enveloped RNA virus

- Single strand negative RNA
- 15,948 nucleotides
- Coding 8 proteins



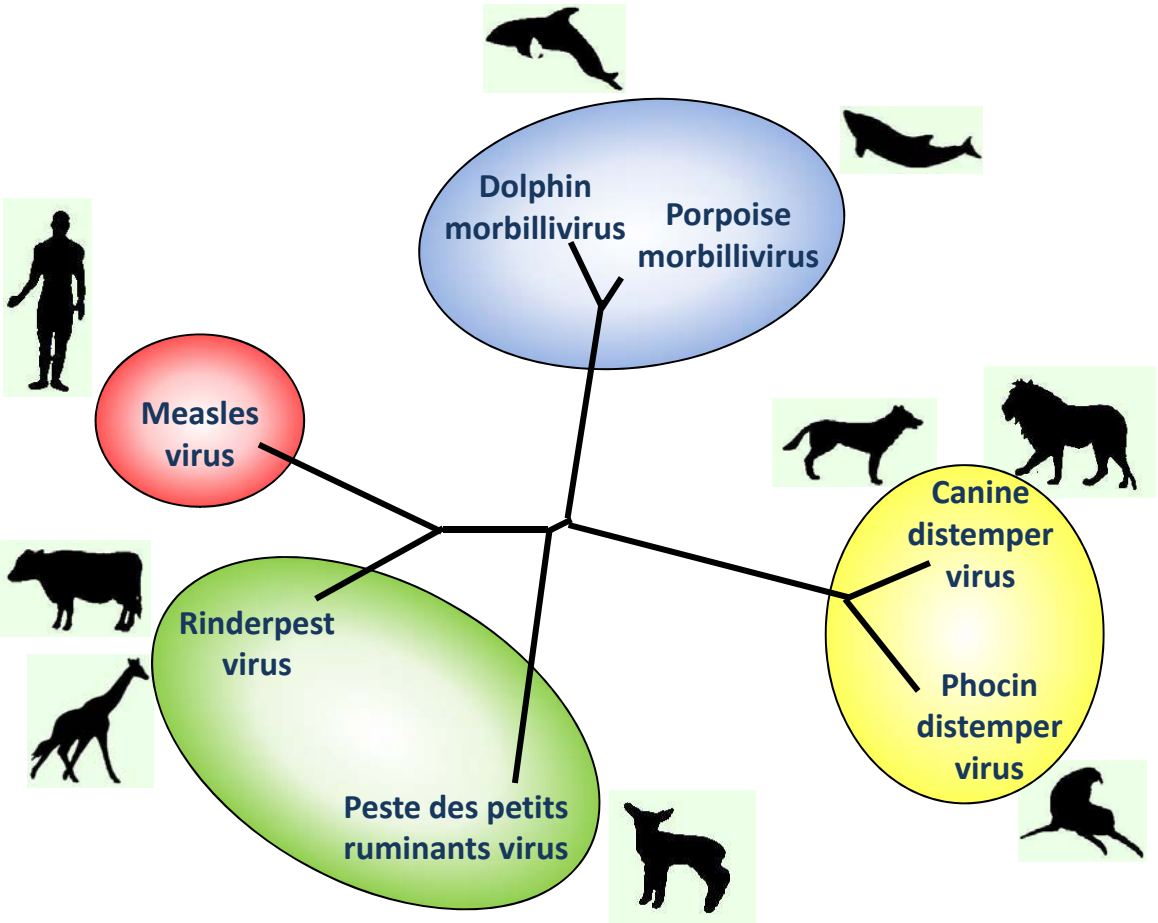


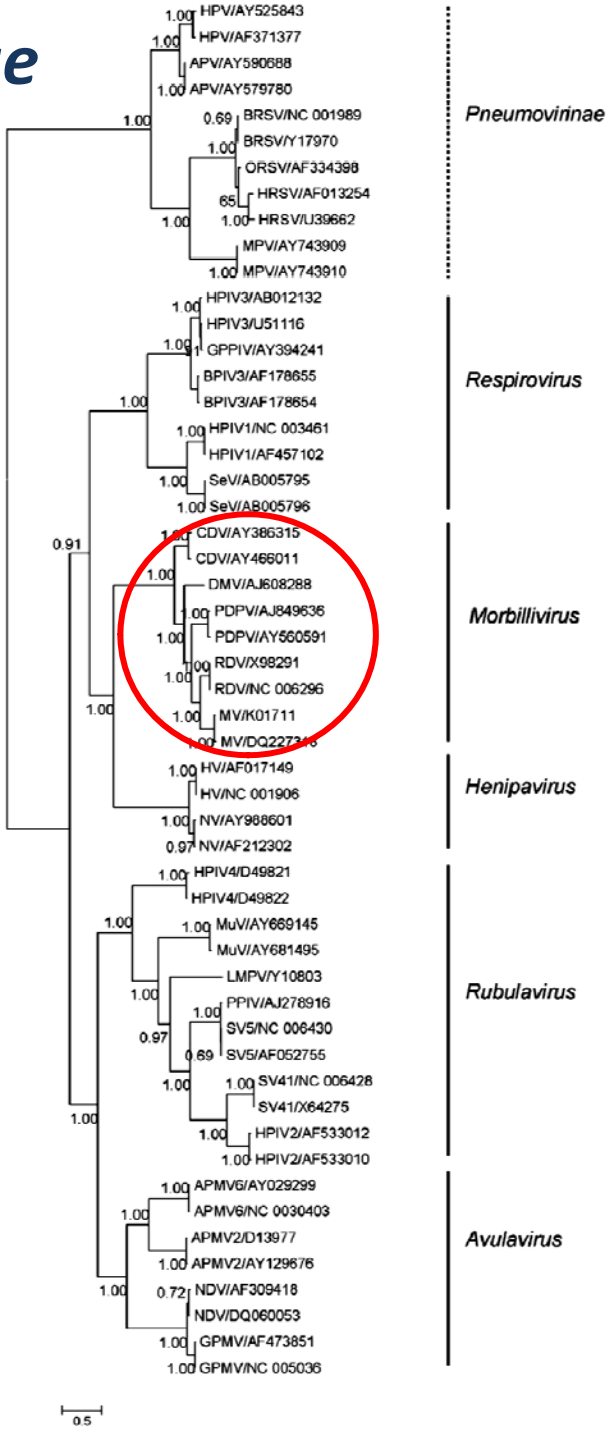


The virus

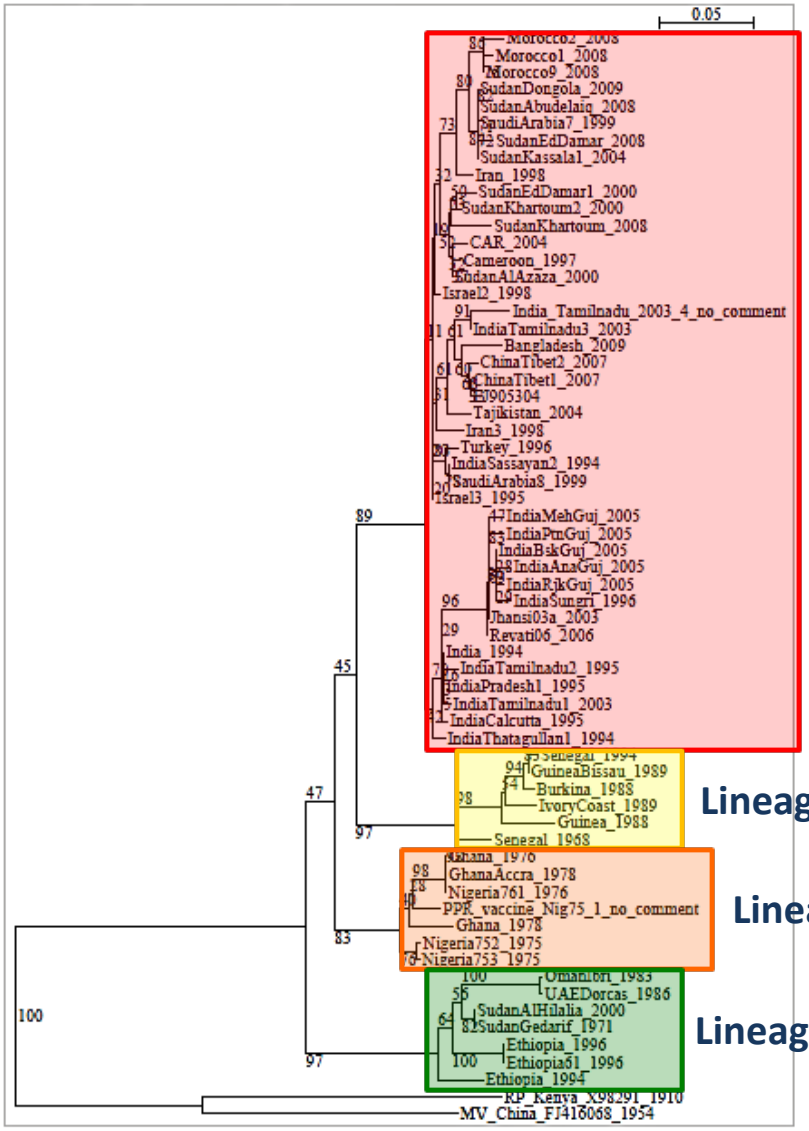
Paramyxoviridae

Morbillivirus



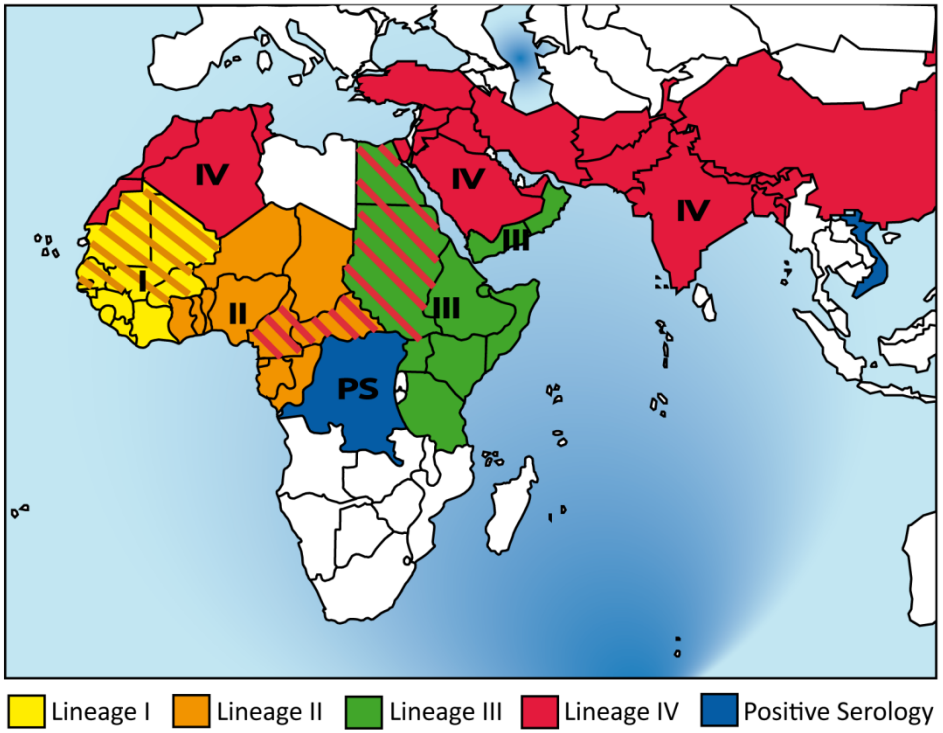


The virus

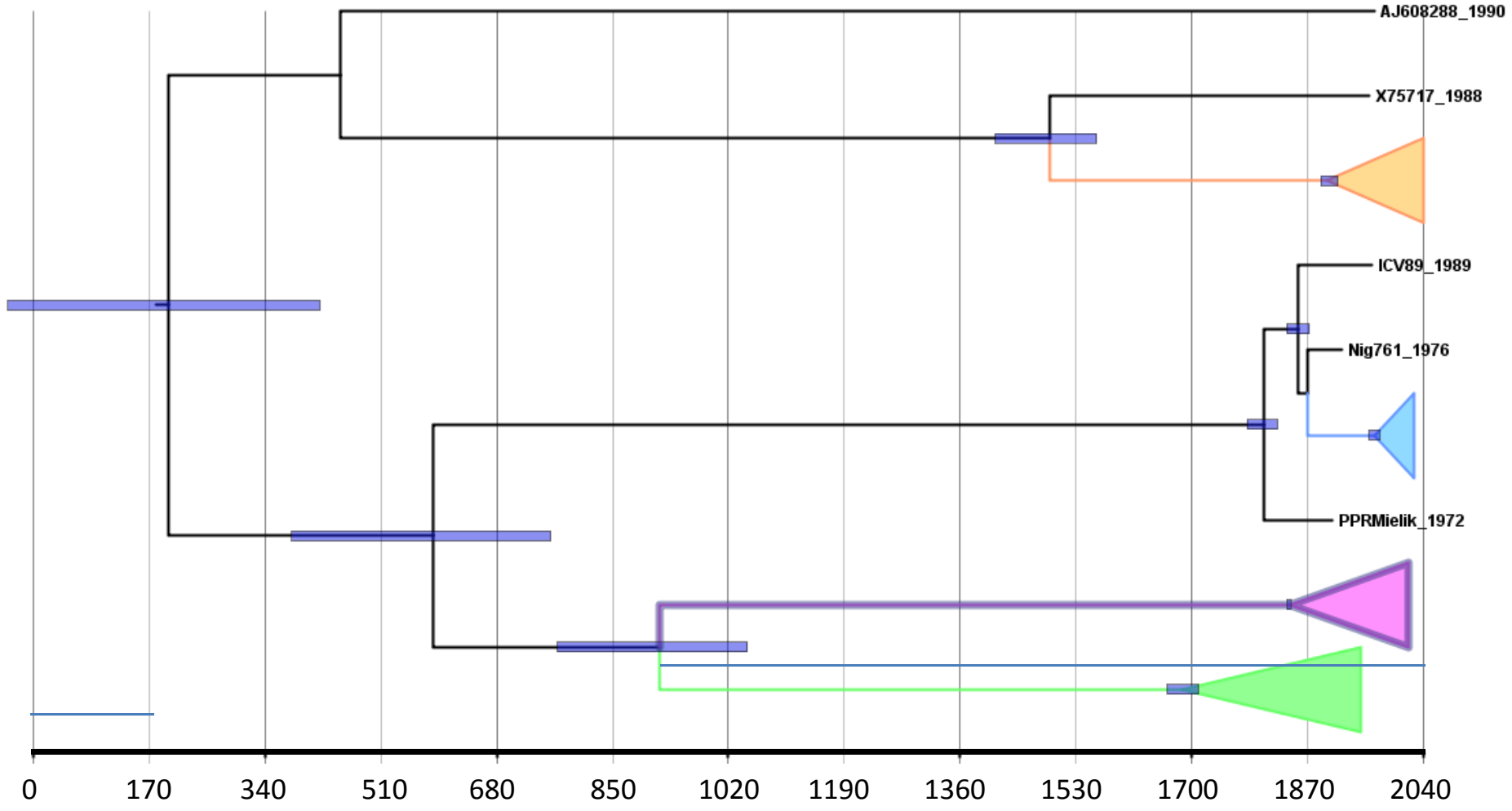


4 lineages of PPR

(on N and F genes)

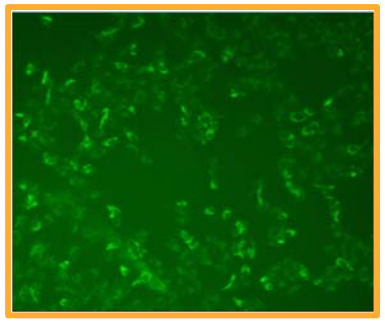


The virus

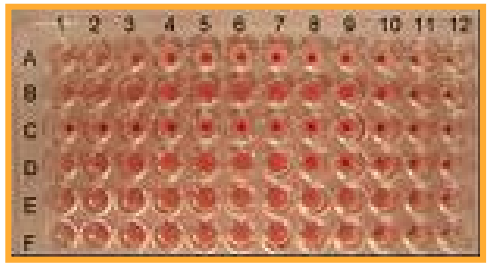

AJ608288_1990
X75717_1988
ICV89_1989
Nig761_1976
PPRMielik_1972
0
170
340
510
680
850
1020
1190
1360
1530
1700
1870
2040

The control tools

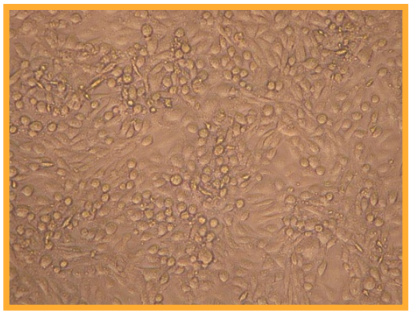
→ Laboratory diagnosis



Immunofluorescence



Haemaglutination



Seroneutralization

ELISA

PCR

Virus isolation on cells

Performances at the European level

PPR ring trial

7 participating laboratories:

NVRI (Poland)
IAH (UK)
CODA-CERVA (Belgium)
CVI (The Netherlands)
FLI (Germany)
DTU (Denmark)
CISA-INIA (Spain)

- Serological proficiency testing: 15 coded sera

- Virological proficiency testing: 5 coded samples to be tested

Results at a glance

- Serological testing: 7/7 lab participation
  ➔100% conforming results

- Conventional PCR: 5/7 lab participation,
  ➔4/5 conforming results and excellent sensitivity

- Real-time PCR: 6/7 lab participation
  ➔ 5/6 have conforming results

EPIZONE

The control tools

Peste des petits ruminants vaccine

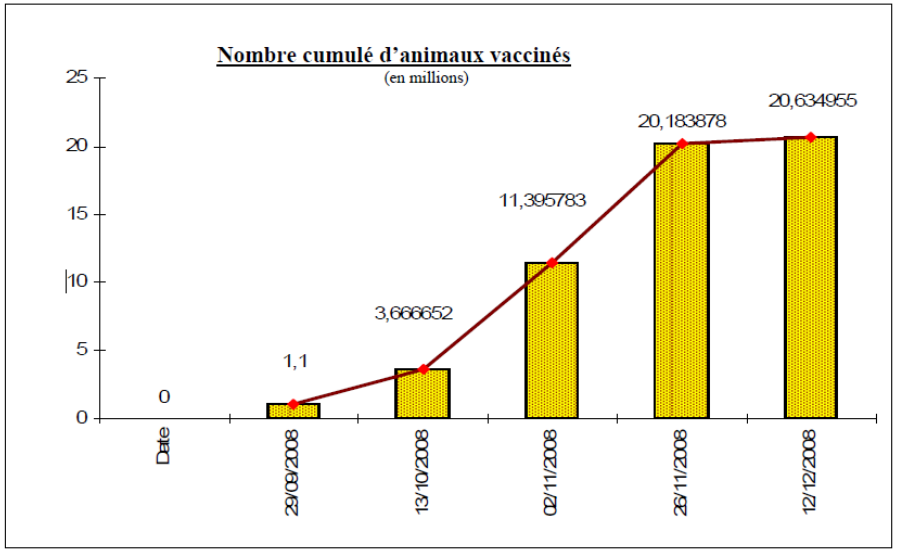
Origin: Nigeria 75/1 strain (lineage II)
attenuated on Vero cells

Development: CIRAD & IAH (1980)

Protection: at least 3 years
after a single shot

Scalable for mass production

Biopharma Morocco



Feasibility of eradication

IN FAVOUR:

- Thermostable vaccine available
- Diagnostic tools available
- International motivation and mobilization after the success of rinderpest eradication
- Exxperience of Rinderpest eradication

BUT

- Specificity of PPR epidemiology:
  - higher mobility and turn over of shoats
  - difficult access in some countries
  - long distance animal movements
- National resources to be strengthened in African countries in a context of growing political instability

Prospects for future research

- Epidemiological role of camelids and wild life in PPR spread and maintenance (in view of eradication)
- Modeling of PPR epidemiology, vaccine performances and local demography, geography and economy for improved control and development of decision-making tools
- Development of pen-side tests and DIVA vaccines (needs for a mouse infectious model!)

Concluding remarks

Risk assessment for Europe

Principal risks of introduction

- Illegal introduction of
  an infected animal in a herd

- Leakage of the virus from
  A BSL3 laboratory

- Biosecurity reasons

Everything's almost under control (?)

Acknowledgments

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